

THREE NEW OLPIID PSEUDOSCORPIONS FROM CALIFORNIA (PSEUDOSCORPIONIDA, OLPIIDAE)

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Pseudoscorpions of the family Olpiidae are not well represented in the Pacific coast states. Benedict and Malcolm (1977) have recently discussed the distribution of *Pseudogarypinus frontalis* (Banks) in California, Oregon and Washington and of *Oreolpium nymphum* Benedict and Malcolm in Oregon alone. Other than these, there is only the single record of *Hesperolpium slevini* (Chamberlin) from El Centro, Imperial County, California (Chamberlin 1930). Due to the recent efforts of several active field biologists in central and southern California, 3 new species have been discovered. I am indebted to F. G. Andrews, K. W. Cooper and D. Giuliani for sending the specimens.

Family Olpiidae Chamberlin

With the following characteristics: all legs diplotarsate; movable finger of chelicera without marginal teeth; both chelal fingers with functional venom apparatus; coxal area parallel-sided; legs with arolia longer than claws.

Subfamily Olpiinae Banks

With these additional characteristics: all abdominal tergites entire; pedal arolia entire; often 1 or 2 trichobothria on dorsum of palpal femur; usually 3 setae in cheliceral flagellum.

Tribe Hesperolpiini Hoff

This tribe was defined by Hoff (1964:30) with *Hesperolpium slevini* (Chamberlin) as the type, and including the newly described *Aphelolpium scitulum* Hoff from Jamaica. The diagnostic characters are the long venom ducts in the chelal fingers and the first leg with telofemur distinctly shorter than basifemur.

The genus *Hesperolpium* was defined by Chamberlin (1930:606) on the basis of *Olpium slevini* Chamberlin from Baja California, Mexico. As mentioned above, only one record was cited for California; no further specimens have been reported. Because the original description of *H. slevini* was sketchy in many respects, it seems appropriate to report more complete data here.

Hesperolpium slevini (Chamberlin)

Olpium slevini Chamberlin, 1923:363–364.

Hesperolpium slevini, Chamberlin, 1930:607.

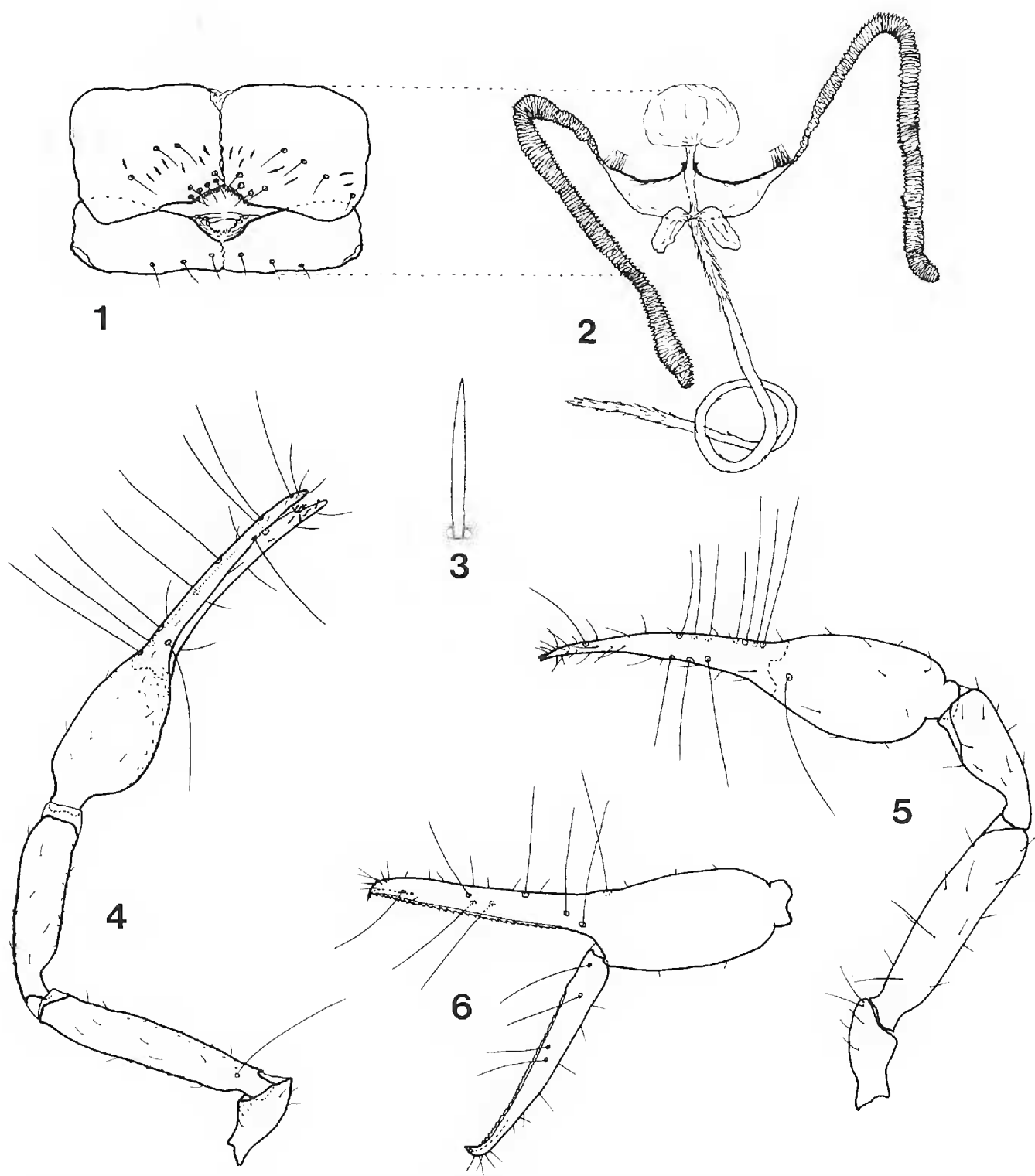
Material examined.—Holotype male (CAS Type 1272), allotype female and paratype female from Cuesta Blanca, near Loreto, Baja California, Mexico; and 11 other specimens from several locations in Baja California [California Academy of Sciences]. Also (new record), one male from Telegraph Pass, Yuma County, Arizona, 9 October 1963 (J. and W. Ivie) [American Museum of Natural History].

Description.—The original description of Chamberlin is fairly accurate as far as it goes and includes 4 figures. Additional illustrations are given in Chamberlin 1931:Figs. 2; 4,G; 16,F; 32,E; 37,N,O; 42,F,G. The following will supplement that information.

Males and females similar, but females somewhat larger and more robust. Surface of carapace finely granulate, especially laterally; setae very fine and difficult to count, probably about 30 in all and with 6–8 at anterior and 4 at posterior margin. Tergites and sternites entire; surfaces smooth; pleural membranes finely, longitudinally striate. Tergal chaetotaxy about 4:4:4:6:6:6:6:6:1T4T1:1T4T1:1T4T1:2. Sternal chaetotaxy of holotype male 14:[3–2]:(0)6(0):(0)8(0):8:9:9:8:8:2TT2:0:2; as Chamberlin points out (1923:363) the 11th sternite is weakly chitinized, and that part of the circumanal ring bears no setae. Distribution of setae on genital opercula and internal genitalia of male from Arizona shown in Figs. 1 and 2. Chaetotaxy of anterior sternites of female about 6:(0)6(0):(0)8(0):8:9:–.

Chelicera about $\frac{1}{3}$ as long as carapace; hand with 5 setae; flagellum of 1 large and 2 small setae, all dentate in distal halves; lamina exterior present; movable finger with subterminal lobe nearly lateral to terminal cusp; galea long, slender, trifid at tip; galeal seta inserted near base of galea.

Palps generally as indicated by Chamberlin. Proportions of segments variable: trochanter 2.1–2.3, femur 3.5–4.2, tibia 2.9–3.6, and chela (without pedicel) 3.1–3.9 times as long as broad; hand (without pedicel) about 1.5 times as long as deep; movable finger 1.35–1.65 times as long as hand. Small granules scattered over most of trochanter and femur and on medial sides of tibia and chelal hand. Most setae very small and inconspicuous. Palpal femur with a small but obvious trichobothrium on dorsum about $\frac{1}{4}$ length from proximal end. Trichobothria on chela as shown by Chamberlin (1931:Fig. 37,O). The group of small sensory setae near tip of movable chelal finger (Chamberlin, 1931:Fig. 37,N and O) numbering 4–12; distal and proximal to this group on the movable finger and in 2 or 3 longitudinal rows on the fixed finger are a number of short dagger-shaped setae (Fig. 3), somewhat similar to those described on *Aphelolpium* (Muchmore, 1979:202 and Fig. 19). Fixed finger with 45–55 contiguous, marginal teeth, most with



Figs. 1–6. Figs. 1–3, *Hesperolpium slevini* (Chamberlin): 1, Genital opercula of male; 2, Internal genitalia of male; 3, Dagger-shaped seta from palpal coxa. Fig. 4, *Hesperolpium andrewsi*, new species, holotype tritonymph: Dorsal aspect of left palp. Figs. 5 and 6, *Neoamblyolpium giulianii*, new species, holotype male: 5, Dorsal aspect of right palp; 6, Lateral aspect of left chela.

distinct cusps; movable finger with 40–45 teeth, less well developed and only about half of them (toward the distal end) with cusps. Both chelal fingers with well developed venom apparatus having long ducts (see Chamberlin, 1931:Fig. 32,E), the nodi ramosi situated well proximad of trichobothria *t* and *it*.

Legs not remarkable, except that the setae on the outer margins are very small and inconspicuous, allowing the heavier, inner setae described by Chamberlin (1923:363) to stand out by comparison. Arolia not divided, longer than claws.

Measurements (mm).—Figures given first are for the holotype male, followed in parentheses by ranges for 12 other specimens (male and female) from Baja California. Body length 2.95(3.2–5.2). Carapace length 0.93(0.89–1.26). Chelicera 0.30(0.27–0.36) long. Palpal femur 0.92(0.87–1.235) by 0.245(0.245–0.355); tibia 0.85(0.835–1.07) by 0.26(0.26–0.38); chela (without pedicel) 1.52(1.47–2.145) by 0.41(0.41–0.65); hand (without pedicel) 0.59(0.59–0.87) long; pedicel 0.12(0.11–0.15) long; movable finger 0.94(0.90–1.28) long. Leg IV: entire femur 0.79(0.75–1.07) by 0.30(0.29–0.36).

***Hesperolpium andrewsi*, new species**
(Fig. 4)

Material.—Holotype tritonymph (WM 5407.01001), taken in a pit trap in Eureka Valley, Inyo County, California, June 1978 (F. G. Andrews and D. Giuliani). The type is deposited in the California Academy of Sciences.

Diagnosis.—Similar to *Hesperolpium slevini* (Chamberlin) in most respects, but probably larger and with distinctly more slender appendages.

Description of tritonymph.—With the characters of the family Olpiidae, subfamily Olpiinae, and tribe Hesperolpiini (Hoff, 1964:30) and with the following particular features. Palps light brown, other parts tan. Carapace 1.65 times as long as broad, distinctly narrowed in front of eyes; surface smooth; 4 corneate eyes; about 24 small, inconspicuous setae, 6 at anterior and 4 at posterior margin. Coxal area typical, parallel-sided. Abdomen typical; tergites and sternites entire; pleural membranes finely, longitudinally striate. Tergal chaetotaxy 2:2:5:4:5:4:6:6:5:T2T:1T4T1:2. Sternal chaetotaxy 2:(0)5(0):(0)6(0):6:6:6:6:6:2TT2:0:2.

Chelicera 0.3 as long as carapace; hand with 5 setae; flagellum of 3 setae, the large, distal one strongly dentate; lamina exterior present; fixed finger with 6 small teeth; movable finger with subapical lobe; galea slender, with 3 small rami; galeal seta set near base of galea; serrula exterior with 18 or 19 blades.

Palp rather slender (Fig. 4); trochanter 2.2, femur 5.05, tibia 3.95, and chela (without pedicel) 4.6 times as long as broad; hand (without pedicel) 1.9 times as long as deep; movable finger 1.7 times as long as hand. Femur 1.11 and chela 1.75 times as long as carapace. Tiny granules scattered sparsely over trochanter and femur and on medial sides of tibia and chelal hand. Most setae small and inconspicuous. Femur with a trichobothrium on the dorsum about $\frac{1}{4}$ length of segment from proximal end. Trichobothria on chela as shown in Fig. 4; only 10 present as is usual in tritonymphs, the

missing ones apparently *sb* and *ist*. Movable finger with a group of 15–18 short, spatulate setae in a shallow depression on the lateral side, distal to trichobothrium *t*; as in *H. slevini*, there are short dagger-shaped setae near this group and on fixed finger. Both fingers with well developed venom teeth and venom apparatus; ducts slender and long; the nodi ramosi just distal to trichobothrium *it* and just proximal to *t*.

Legs typical. Leg I with basifemur 1.95 times as long as telofemur. Leg IV with entire femur 4.4 and tibia 6.5 times as long as deep. Arolia not divided, longer than claws. Subterminal tarsal setae simple.

Male and female.—Unknown.

Measurements (mm).—Body length 3.16 mm. Carapace length 0.865; greatest breadth 0.52. Chelicera 0.26 by 0.15. Palpal trochanter 0.405 by 0.185; femur 0.90 by 0.195; tibia 0.79 by 0.20; chela (without pedicel) 1.515 by 0.33; hand (without pedicel) 0.57 by 0.30; pedicel 0.08 long; movable finger 0.975 long. Leg I: basifemur 0.445 by 0.095; telofemur 0.23 by 0.09; leg IV: entire femur 0.815 by 0.185; tibia 0.62 by 0.095; metatarsus 0.325 by 0.06; telotarsus 0.25 by 0.05.

Etymology.—The species is named for Dr. Fred G. Andrews, who helped collect and kindly sent the specimen.

Remarks.—Though it is usually not good practice to describe species of pseudoscorpions on the basis of nymphs, this form is so clearly different from *H. slevini* that it deserves recognition. This tritonymph is nearly as large as the smaller males of *H. slevini*, and the palps and legs are all more slender than those of any *H. slevini* adult.

Subfamily Garypininae Daday

Distinguished by these characters: at least some abdominal tergites medially divided; pedal arolia divided; 4 setae in cheliceral flagellum.

The genus *Neoamblyolpium* was described by Hoff (1956:27) on the basis of *N. alienum* Hoff from north central New Mexico. That species was also reported from a wide area of the Rocky Mountains in Colorado (Hoff, 1961), but has not been reported subsequently.

Neoamblyolpium giulianii, new species (Figs. 5 and 6)

Material.—Holotype female (WM 4887.01001) from berlese extraction of *Cercocarpus* duff at 8300 feet, 10 miles south of Independence, Inyo County, California, 2 January 1976 (D. Giuliani). The type is in the Florida State Collection of Arthropods, Gainesville.

Diagnosis.—Similar to *Neoamblyolpium alienum* Hoff, but larger and with more slender appendages; palpal femur 0.525 mm long and 4.4 times as long as broad.

Description of female (male unknown).—With the characters of the genus (see Hoff, 1956:27). Generally light brown to tan; all surfaces smooth. Carapace longer than broad; poorly sclerotized posteriorly; anterior margin slightly convex; with four large corneate eyes; chaetotaxy 4-4-2-2-2-2-4 = 20.

Abdomen elongate; tergites 2–10 and sternites 3–10 divided; pleural membranes longitudinally wrinkled; tergal chaetotaxy 6:5:6:6:6:6:8:6:8:T2 T2T2T:TTTT:2; sternal chaetotaxy 8:(0)6(0):(1)8(1):8:10:10:9:9:T2T2T2 T:1TT1:2. Disposition of setae on genital opercula as in *N. alienum*; lateral and median cribriform plates present but obscure.

Chelicera 0.3 as long as carapace; hand with 5 long, acuminate setae; flagellum of 4 subequal setae, the distal one terminally dentate; no lamina exterior is evident; serrula exterior of 16 or 17 blades; tip of movable finger incised; galea long, slender, terminally trifid.

Palp slender (Fig. 5); femur 0.87 and chela 1.47 times as long as carapace; trochanter 2.25, femur 4.4, tibia 2.55 and chela (without pedicel) 4.05 times as long as broad; hand (without pedicel) 1.75 times as long as deep; movable finger 1.42 times as long as hand. There are 4 or 5 setae on the dorsum of the femur, but none is conspicuously larger than the others. Trichobothria on chela shown in Fig. 6, much as in *N. alienum* but *ist* slightly closer to *it* than to *isb*. Fixed chelal finger with 29 cusped teeth; movable finger with 23 more weakly developed teeth, lacking cusps in proximal half of row. Both fingers with well developed venom apparatus.

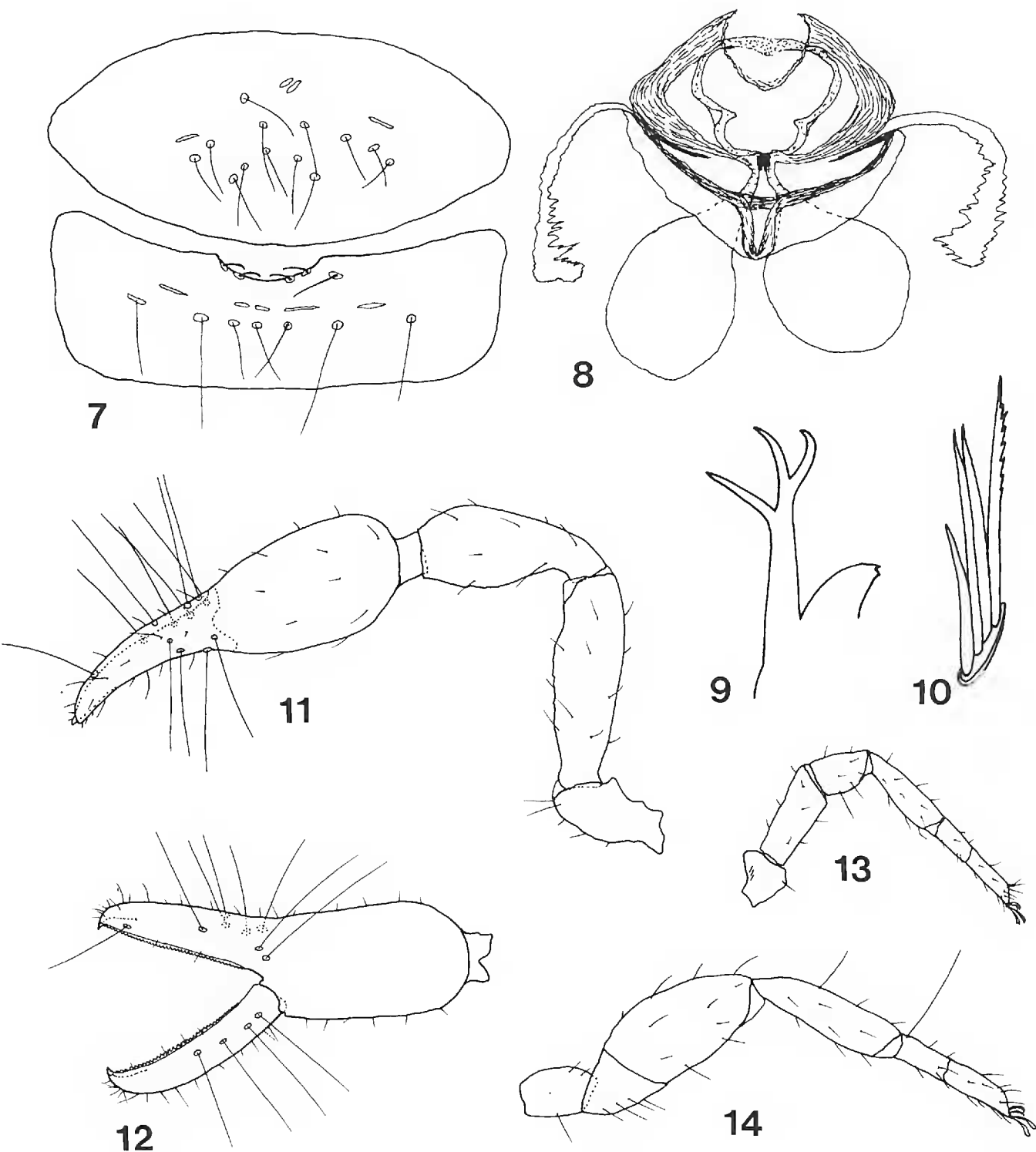
Legs rather slender. Leg I with basifemur 2 times as long as telofemur. Leg IV with entire femur 2.95 and tibia 4.05 times as long as deep. Arolia longer than claws and bifid.

Measurements (mm).—Body length 2.30. Carapace length 0.605. Chelicera 0.185 by 0.105. Palpal trochanter 0.25 by 0.11; femur 0.525 by 0.12; tibia 0.33 by 0.13; chela (without pedicel) 0.89 by 0.22; hand (without pedicel) 0.37 by 0.21; pedicel 0.045 long; movable finger 0.525 long. Leg I: basifemur 0.26 by 0.085; telofemur 0.125 by 0.075. Leg IV: entire femur 0.47 by 0.16; tibia 0.325 by 0.08; metatarsus 0.16 by 0.06; telotarsus 0.19 by 0.045.

Etymology.—The species is named for Derham Giuliani, who collected the specimen.

Remarks.—This is the second described species of the genus *Neoamblyolpium*. The type species, *N. alienum*, is known only from juniper, pin-yon and yellow pine litter in the Rocky Mountains in New Mexico and Colorado, where it has been found only at altitudes of 6000–7500 feet (Hoff, 1956, 1959, 1961).

The genus *Pseudogarypinus* Beier has recently been reviewed by Benedict and Malcolm (1977) in regard to its occurrence in the United States. Two species are recognized, the widespread *P. frontalis* (Banks) and the rare *P. giganteus* Hoff.



Figs. 7–14. *Pseudogarypinus cooperi*, new species: Fig. 7, Genital opercula of male; Fig. 8, Internal genitalia of male; Fig. 9, Galea of male; Fig. 10, Flagellum; Fig. 11, Dorsal aspect of right palp; Fig. 12, Lateral aspect of left chela; Fig. 13, Leg I; Fig. 14, Leg IV.

***Pseudogarypinus cooperi*, new species**
(Figs. 7–14)

Material.—Holotype male (WM 4729.02001) from juniper litter below *Neotoma fuscipes* nest in the Gavilan Hills, south of Riverside, Riverside County, California, 20 March 1977 (K. W. Cooper); 19 paratypes, of both sexes, from several localities in Riverside, San Bernardino and San Diego

Counties, California, usually in close association with pack rats (K. W. Cooper and J. A. Moore). The types are in the Florida State Collection of Arthropods, Gainesville.

Diagnosis.—The smallest known species of the genus, with palpal femur less than 0.7 mm in length.

Description.—Males and females similar, though females slightly larger. Carapace and palps light reddish brown, other parts much lighter. Carapace longer than broad; surface smooth; 4 corneate eyes; 24–26 setae, with 4 near anterior and 4 near posterior margin. Coxal area typical of genus. Abdomen long, narrow; tergites 2–10 and sternites 4–10 divided; pleural membranes longitudinally finely striate. Tergal chaetotaxy variable, but about 6:6:7:7:7:8:8:7:6:T1T2T1T:1T2T1:2. Sternal chaetotaxy of holotype male 14:(3)2–3/10(3):(2)7(2):9:8:9:9:8:T2T2T2T:2T2T2:2; genital opercula and internal genitalia of male as in Figs. 7 and 8. Anterior genital operculum of female with 9–11 setae on surface and posterior operculum with 9 or 10 setae; spiracular plates with 2 or 3 setae; cribriform plates variable, but generally similar to those of *P. frontalis* (Benedict and Malcolm, 1977:Fig. 17).

Chelicera about 0.35 as long as carapace; hand with 5 long setae; flagellum of 4 setae, of different lengths, and distal one dentate (Fig. 10); fixed finger with 6 small teeth; apical tooth of movable finger slightly incised, subapical lobe heavy; narrow lamina exterior present; galea slender, with 1 lateral and 2 terminal rami (Fig. 9); serrula exterior of 19 or 20 blades.

Palp moderately slender, with femur distinctively narrowed distally (Fig. 11). Femur 3.0–3.7, tibia 2.05–2.35, and chela (without pedicel) 2.85–3.4 times as long as broad; hand (without pedicel) 1.55–1.9 times as long as deep; movable finger 0.90–1.0 times as long as hand. Surfaces mostly smooth, but few small granules medially on femur, tibia and chelal hand. Trichobothria of chela as in Fig. 12; *isb* slightly closer to *ib* than to *ist*. Fixed chelal finger with 35–40 distinct, cusped marginal teeth; movable finger with about same number of similar teeth, though cusps become obsolete proximally in row. Both fingers with well developed venom apparatus; ducts long and narrow, each nodus ramosus about $\frac{1}{5}$ length of finger from distal end.

Legs rather robust; leg I with basifemur 1.6–1.7 times as long as telofemur (Fig. 13); leg IV with entire femur 2.5–2.8 and tibia 3.25–3.55 times as long as deep (Fig. 14). Tibia of leg IV with a short, and metatarsus with a very long, tactile seta. Arolia longer than claws and deeply divided.

Measurements (mm).—Figures given first are for the holotype male, followed in parentheses by ranges for the other available specimens, both male and female. Body length 2.7(2.55–3.25). Carapace length 0.67(0.66–0.80). Chelicera 0.245(0.23–0.29) long. Palpal femur 0.555(0.525–0.66) by 0.16(0.155–0.205); tibia 0.465(0.46–0.58) by 0.215(0.205–0.25); chela (with-

out pedicel) 0.94(0.91–1.12) by 0.295(0.29–0.38); hand (without pedicel) 0.49(0.48–0.63) by 0.295(0.28–0.38); pedicel about 0.07 long; movable finger 0.48(0.46–0.54) long. Leg I: basifemur 0.26(0.25–0.28) by 0.105(0.105–0.12); telofemur 0.155(0.155–0.17) by 0.11(0.10–0.11). Leg IV: entire femur 0.555(0.53–0.66) by 0.205(0.20–0.325); tibia 0.40(0.385–0.41) by 0.115(0.115–0.125).

Etymology.—The new species is named for Kenneth W. Cooper, who collected most of the specimens, along with many other pseudoscorpions in southern California.

Remarks.—Heretofore, 2 species of the genus *Pseudogarypinus* have been recognized in the United States, *P. frontalis* (Banks) widely distributed in the western states from New Mexico to Washington, and *P. giganteus* Hoff from only a single locality in Colorado (see Benedict and Malcolm, 1977). The new species, known at present from a restricted area in southern California, is easily distinguished from the others by its small size. In addition, it differs in having fewer setae on the tergites and sternites and on the spiracular plates, in having fewer teeth on the chelal fingers, and in the length and placement of the rami on the galea.

Acknowledgments

Publication of this paper is supported in part by a grant from the Office of Naval Research (CNA SUB N00014-76-C-001). I am indebted to C. H. Alteri for preparing the illustrations.

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